

Agena Engine 'Hard-Starts' During Test of Modifications

Gemini VIII launch date announcement and choice of rendezvous target remained fluid at *Roundup* press time because of failure last Saturday of a modified Agena engine during a test run at the USAF Arnold Engineering Development Center, Tullahoma, Tenn.

The engine had completed five successful high-altitude starts at above 400,000 feet in the Center's J2A test cell, all with nominal start sequences. On the sixth test at low chamber altitude the engine failed in a "hard-start" mode and forced termination of the test. The engine was substantially damaged, but early checks show that the facility itself received no significant damage.

Further testing of Agena engine modifications has been suspended until the cause of the failure can be pinned down either to problems in the engine itself or in the facility. The engine modifications are a result of the Gemini VI Agena rendezvous vehicle to achieve orbit

last October 25 following an apparent hard-start of the Agena's primary propulsion system.

Should delays in completing the tests of Agena engine modifications adversely affect the Gemini VIII launch schedule, the substitution of the Augmented Target Docking Adapter (ADTA) is planned. The ADTA is a McDonnell-built passive docking target utilizing existing Gemini and Agena hardware—docking collar, radar transponder, tracking beacons, RCS for attitude stabilization and digital command system for ground command. The ADTA would be placed into a 161 nm circular orbit by an Atlas standard launch vehicle.

A decision as to whether the Gemini VIII rendezvous vehicle will be Agena 5003 or the ADTA will not be made until a complete analysis is made of Saturday's failure at Tullahoma.

At Launch Complex 19, work crews were finishing electrical interface verifications and joint

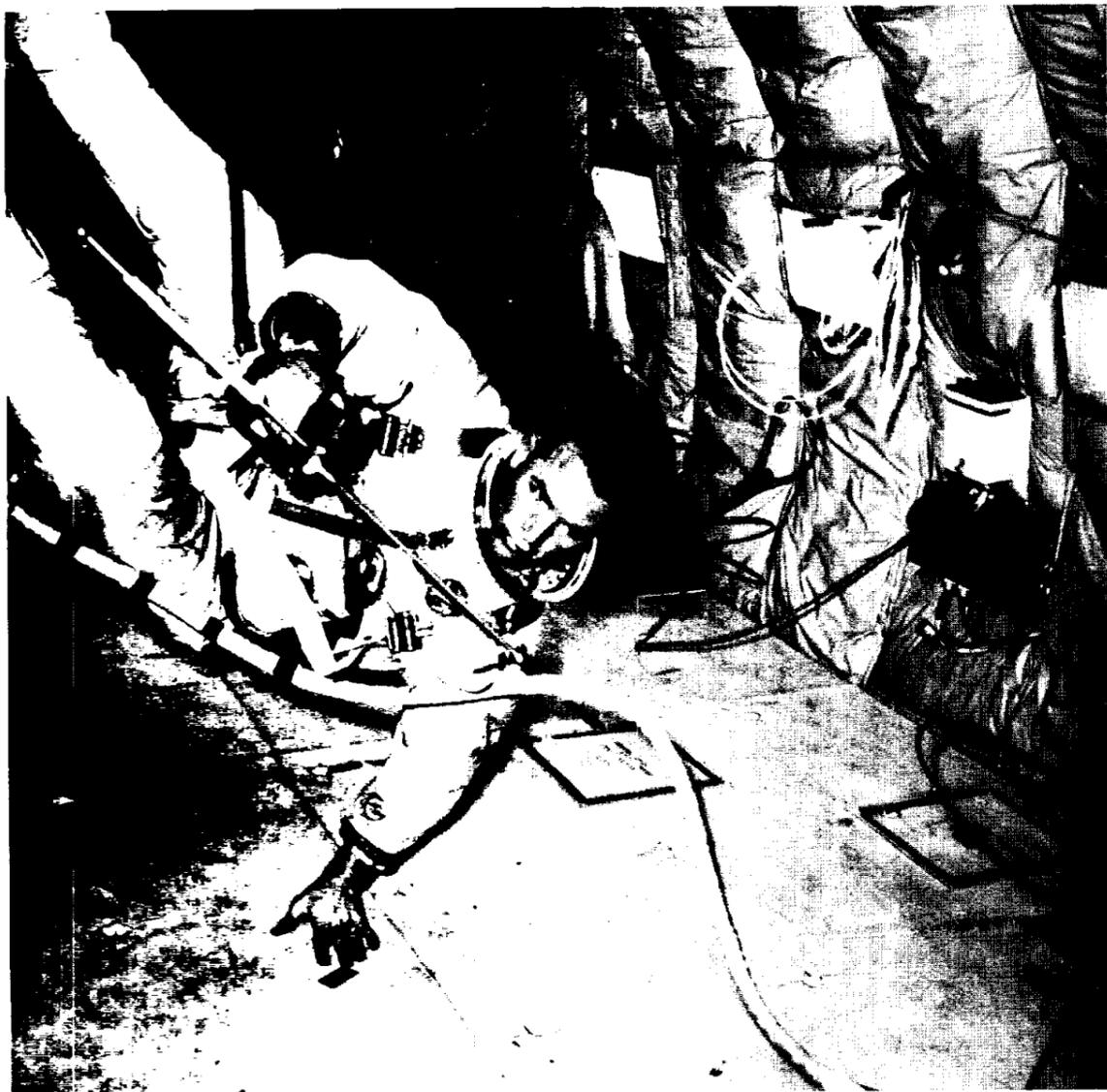
guidance and control tests on Spacecraft VIII in preparation for the Joint Combined Systems Test the middle of next week. Electrical mating of Spacecraft VIII to the launch vehicle was completed last week.

The Atlas standard launch vehicle for launching the Gemini IX Agena arrived at Kennedy Space Center Sunday from GD/Convair, San Diego, Calif.

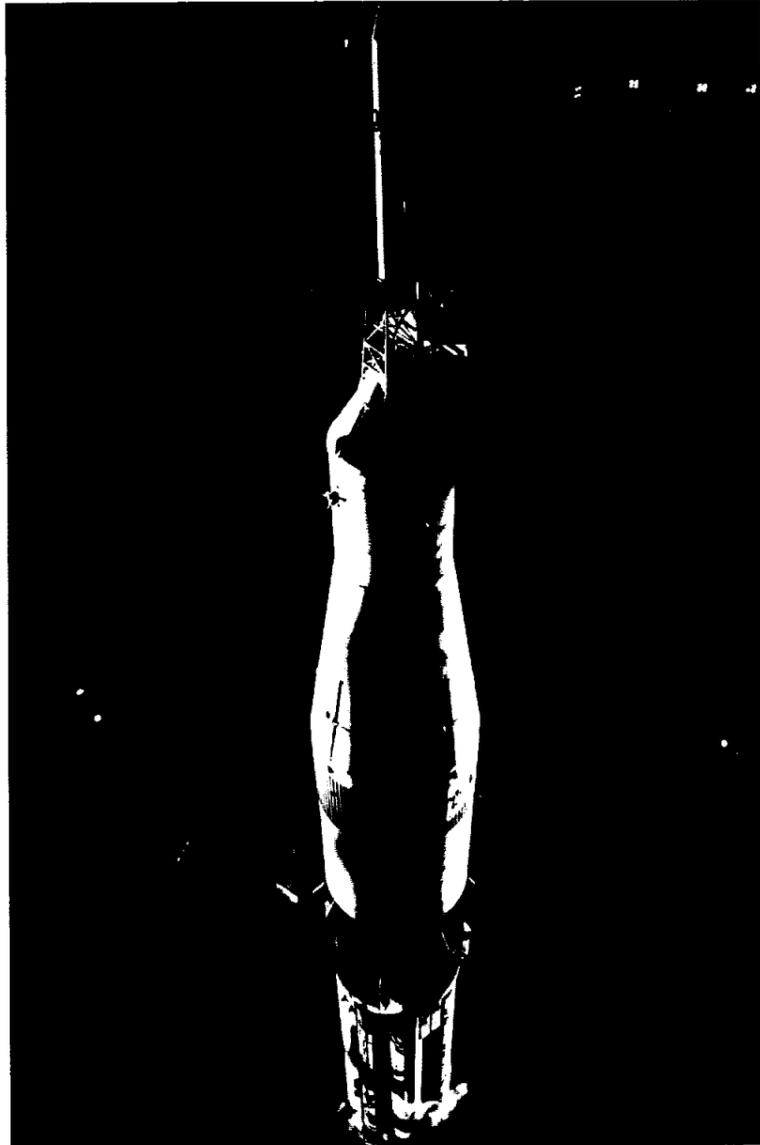
The three-day Gemini VIII mission, manned by Command Pilot Neil A. Armstrong and Pilot David R. Scott, includes rendezvous with the chosen target vehicle, more than an orbit of extravehicular activity by Scott, and ten on-board scientific, technological and medical experiments.

Inserted initially into an elliptical orbit of 87 nm perigee and 141 nm apogee, Gemini VIII nominally will rendezvous with the target vehicle approximately five and one half hours after liftoff during the fourth revolution.

(Continued on page 8)



'THIRTY SECONDS EVA'—Gemini VIII Pilot David R. Scott bones up on mission EVA techniques during a weightless simulation flight at Wright-Patterson AFB. He is using a duplicate of the freon-powered maneuvering gun that he will use during his more than one orbit outside Spacecraft VIII. Hopefully, Scott will wear his helmet at that time.



NIGHT WORK—Saturn/Apollo 201 stands in the harsh glare of Launch Complex 34 floodlights during last week's Countdown Demonstration at Kennedy Space Center. The unmanned suborbital 4750-nm flight is scheduled for launch next Wednesday in a test of Apollo command module heat shielding and Saturn IB booster performance.

BEGIN LOADING PROPELLANTS—

'Clean Test,' Says Shea Of Apollo 201 Review

In a countdown to T-0 last Saturday, Apollo/Saturn 201 completed its flight readiness review in what Apollo Spacecraft Program Office Manager Dr. Joseph Shea described as a "very clean test." Ending at

Instrument Slice For Apollo 202 Arrives at Cape

An instrument unit for the second Saturn IB launch vehicle is expected to arrive at the NASA-Kennedy Space Center Wednesday aboard the NASA barge *Palaemon*.

Palaemon left the NASA-Marshall Space Flight Center last Friday night.

IBM assembled the electronic instrument unit for the Marshall Center at its Huntsville facility. The instrument unit contains guidance, control and telemetry equipment for the two-stage Saturn IB rocket.

The Saturn IB instrument unit is a three-foot high wafer which becomes a part of the 22 story tall launch vehicle. The unit is 21½ feet in diameter and weighs some 4,500 pounds.

Palaemon is scheduled to arrive at the Kennedy Space Center about the same time as the launch of Apollo 201.

noon, and encountering no problems, the readiness review audited spacecraft, launch vehicle and ground-support systems.

Hypergolic propellant loading in the command and service module reaction control system and in the service module primary propulsion system began Wednesday and was expected to be completed today. Propellant loading in the Saturn IB launch vehicle is scheduled to begin tomorrow and end late Sunday.

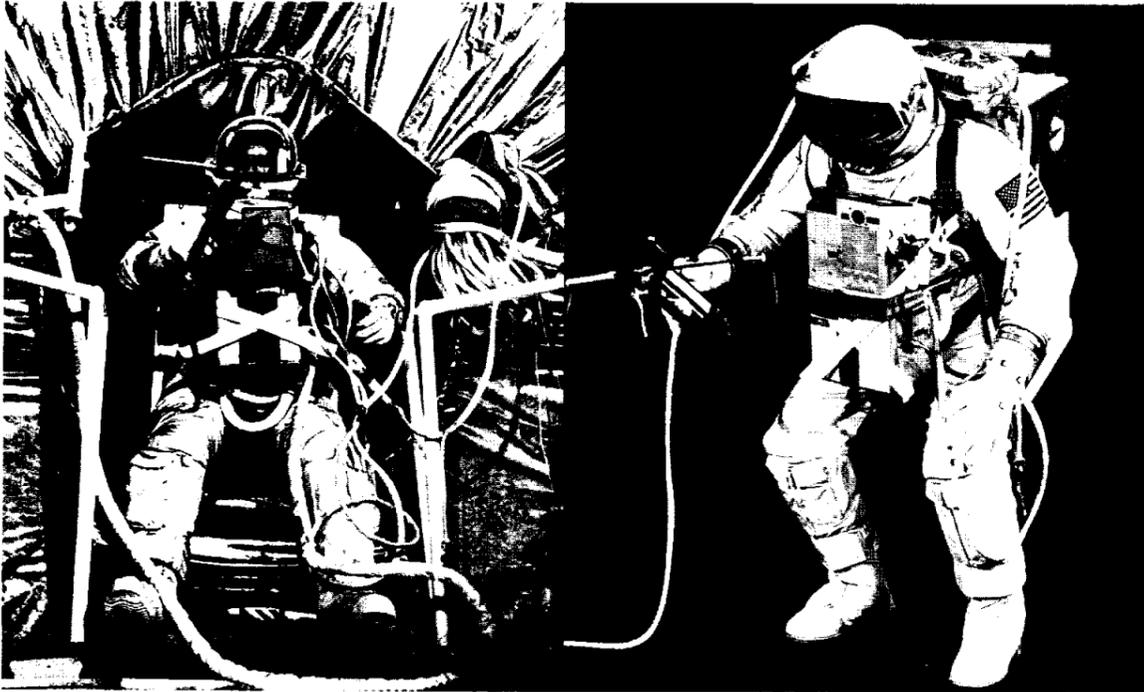
Launch Complex 34 work schedule calls for clean-up and other preparations prior to starting the two-day countdown Tuesday.

Liftoff is still scheduled for Wednesday, February 23 at a tentative time of 6:45 am CST.

Apollo flight controllers in Mission Control Center-Houston spent most of this week in mission simulations—launch aborts on Monday and Tuesday; network simulations Tuesday and Wednesday, and a full network simulation including the tracking ship *Rose Knot* was scheduled for today, with first liftoff at 7 am.

Rose Knot flight controllers were on station Monday ready to support the mission. The *Rose Knot* is hoisted in the South Atlantic northwest of Ascension Island, just north of the Equator.

What the Well-Dressed Gemini Crewman is Wearing



PACKS, FORE AND AFT—Gemini VIII extravehicular equipment has undergone several test and familiarization exercises by crewmen and technicians during the last few weeks. In the left photo, Gemini VIII back-up pilot Richard F. Gordon, Jr. backs into the EVA life-support back pack nested in the adapter of Spacecraft VIII during familiarization at McDonnell in mid-December. Crew Systems Division engineer Fred Spross, at right, models the EVA chest and back packs and the freon-powered maneuvering gun. Gemini VIII prime pilot David R. Scott will spend a full orbit in EVA. Scott's helmet faceplate is gold-plated for filtering the sun's rays, as was Gemini IV pilot Ed White's visor coated.

Lunar Orbiter Spacecraft Passes Tests of Photo-Return Equipment

An earthbound Lunar Orbiter spacecraft has successfully concluded more than a month of important performance demonstration tests at this Mojave desert facility near Goldstone, Calif.

Flight versions of the 850-

pound spacecraft are being counted on to orbit the moon later this year and take sharp close-up photos of likely landing sites for Apollo missions. The program is managed by the NASA Langley Research Center.

The Lunar Orbiter is designed to dip within 29 miles of the moon's surface and take photos that will show objects as small as a card table—or about a yard square.

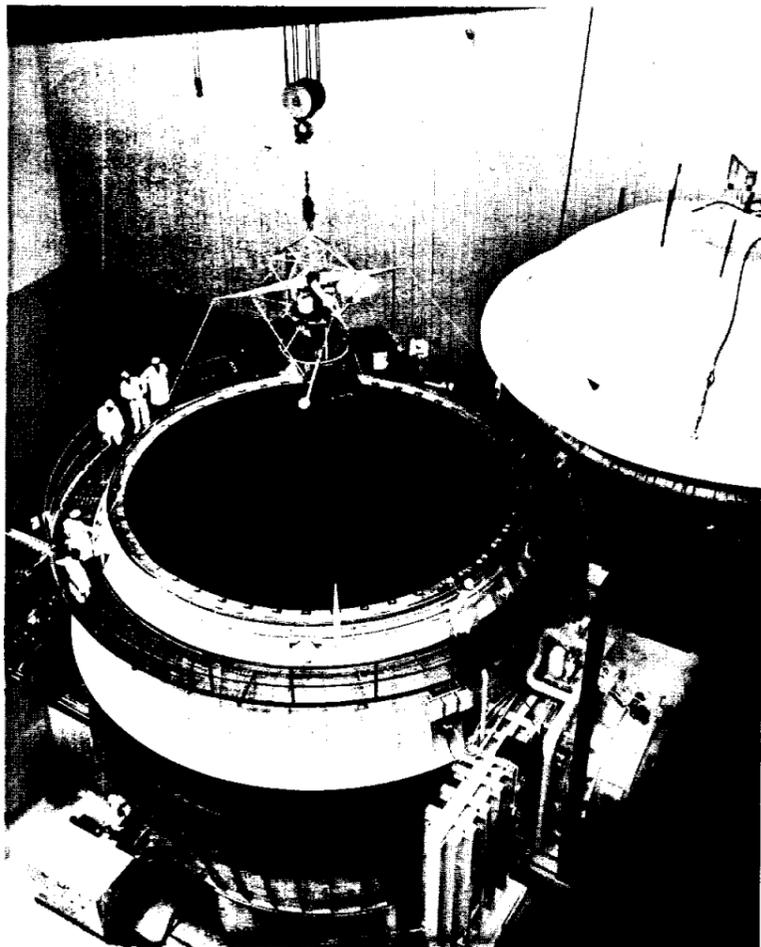
To verify Lunar Orbiter's ability to send photos back to Earth, the test craft was equipped with a camera already loaded with pre-exposed, pre-processed film. Pictures on the film were transmitted as electronic signals and then were turned back into photos, as they will be during an actual mission.

The test spacecraft—one of three built for thorough ground-testing—transmitted the signals using a ground system which attenuated the signal to simulate signal strength which would be encountered at various distances from the Earth to the moon.

The Lunar Orbiter test craft also demonstrated its compatibility with complex ground control stations by receiving commands from the ground and sending back telemetry data. In addition to verifying compatibility between the spacecraft and the Goldstone Station, the site was operated in conjunction with the Mission Control Center, the Space Flight Operations Facility at Pasadena, California, and successful operation of these combined ground facilities was demonstrated.

The spacecraft will be transported in a special van to Cape Kennedy, Florida, where it will be tested with special ground-test and launch facilities. Flight models will follow, with the first launch scheduled for mid-1966.

Boeing's major subcontractors are Eastman Kodak for the camera subsystem, and Radio Corporation of America for the power and communication subsystems.



INTO THE PIT—The first ground-test article of the camera-carrying Lunar Orbiter spacecraft spreads its antennas and solar panels as it is lowered into the gaping maw of Boeing-Seattle's space environment chamber for a real-time simulated photographic mission to the moon. The test, conducted at a simulated altitude of 100 miles and with a temperature range of -300°F to $+250^{\circ}\text{F}$, included a simulated translunar flight and nine lunar orbits, each with a period of three hours. The first launch of the NASA Langley Research Center-managed Lunar Orbiter program is scheduled for mid-1966. Boeing is building five flight spacecraft and three ground-test vehicles.

GENERATING SMOKESCREENS—

High Fog-Index Can Work To Confound Report Reader

A government researcher recently ploughing through documents about who did what, when, where, how and why, came upon a report of activity covering a week's work.

In part, or actually "in whole," the group stated: "Because of the short work week (evidently a holiday shortened the week) and the reorganization of the _____ (name omitted) to protect the innocent and perhaps even the guilty), no report is being submitted."

Some smart-alec reader of this informative report had managed to find room on the crowded page to scribble, "Translated, this means we didn't do nutting this week."

The researcher winced in shock, for was the report not from a group that had in the past contrived and was still contriving so many new and exotic pieces of hardware, had evolved so many ingenious design concepts as yet unheard of or conceived by mankind, and had bested many technical obstacles to the plaudits of the world?

It was indeed an unimaginative piece of writing, even for those who had nothing to report.

As a defense against this sort of ignominy, the researcher offers the following outline for unimaginative report writers. Supervisors may also use the outline for interpreting what their men are really doing.

STANDARD PROGRESS REPORT FOR THOSE WITH NO PROGRESS TO REPORT:

During the period which ends _____ (fill in appropriate date) considerable progress had been made in the preliminary work directed toward the establishment of the initial activities. (*We are getting ready to start, but we haven't done anything yet.*) The background information has been surveyed and the functional structure of the component parts of the cognizant organization has been clarified. (*We looked at the assignment and decided that George would do it.*)

Considerable difficulty has been encountered in the selection of optimum materials and experimental methods, but the problem is being attacked vigorously and we expect that the development phase will proceed at a satisfactory rate. (*George is looking at the handbook.*) In order to prevent unnecessary duplication of previous efforts in the same field, it was necessary to establish a survey team which has conducted a rather extensive tour of the various facilities in the immediate vicinity of manufacturers. (*George and Harry had a nice time in New York.*)

The Steering Committee held its regular meeting and considered rather important policy matters pertaining to the over-all organizational levels of the line and staff responsibilities that devolve on the personnel associated with the specific assignments resulting from the broad functional specifications. (*Untranslatable—sorry!*) It is believed that the rate of progress will continue to accelerate as necessary personnel are recruited to fill billets now vacant. (*We'll get something done as soon as we find someone who knows something.*)

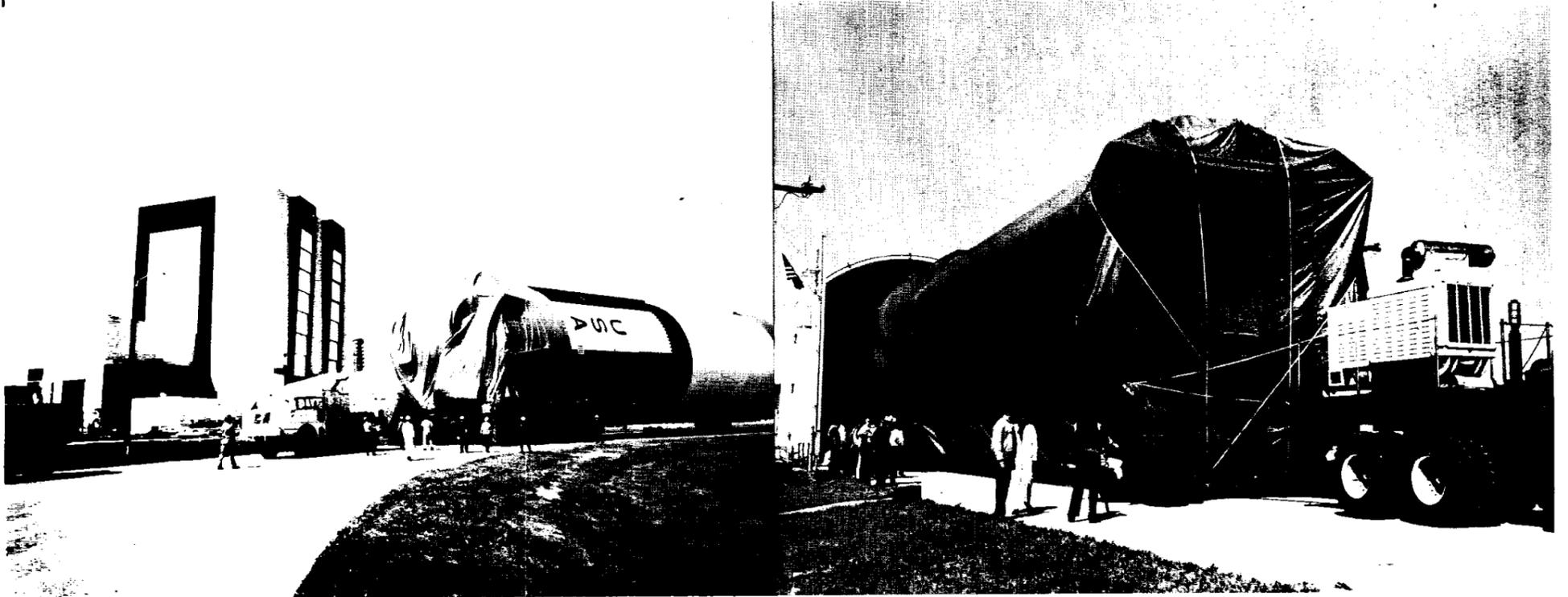
— Anon.

Gentle Landing Coming Up



DROP NO. 150—An instrumented Landing Operational Test Vehicle (LOTV) is caught by the camera just prior to a soft impact at Ellington AFB. The LOTV was developed by the Operational Evaluation and Test Branch of Landing and Recovery for use in a series of tests aimed toward determining optimum turn rates and acceleration for gliding parachutes and wind/obstacle limitations for them. Project engineers for the remote-controlled TV-camera equipped LOTV are Fred Koons and Richard Tuntland.

Heavy Booster Traffic at Cape



TWO SATURN GENERATIONS—The Kennedy Space Center barge dock was busy last week as two fair-sized launch vehicle stages were off-loaded. In the left photo, a Saturn V S-IC facilities test stage en route to the Vertical Assembly Building from the NASA Barge

Poseidon which transported the stage from Marshall Space Flight Center. Right photo shows the Saturn IB for the S/A-202 mission arriving from Michoud Assembly Facility aboard the NASA Barge *Promise*.

PASS THE EARPLUGS—

Noisiest MSC People Work In Acoustics Lab

A group of MSC engineers can lay claim to being among the world's biggest noisemakers when they begin test operations in the Spacecraft Acoustic Laboratory in Building 49.

The 105-foot high tower in the facility can house a complete Apollo spacecraft. The acoustic equipment inside the facility can test the spacecraft reaction to the dynamic loads created by flight through the earth's atmosphere.

Launch noise generated by the Saturn V's 7.5-million pounds thrust engines can be reproduced. The more severe acoustic loading which the spacecraft receives as its velocity reaches the speed of sound can also be simulated.

The buffeting produces a noise which is estimated at 160,000 acoustic watts. As a comparison, the human voice is seven-thousandths of a watt, and a stereophonic phonograph produces 10 watts at full volume.

Sound in the Acoustic Laboratory is produced by a system of sophisticated sirens. The air is drawn through a series of choppers which converts the energy of moving air into acoustic energy.

A battery of 16 fiberglass horns funnel the sound into a steel shroud over the spacecraft. One-third of the sound is diverted upward over the Command Module. The rest of the sound flows downward over the Service Module and Lunar Excursion Module.

With small modifications, the unit can be converted to an echo chamber, with the sound waves bouncing between the spacecraft and the chamber walls.

To keep the sound from causing excessive vibration in the building, a giant muffler, 11 feet high and eight feet in diameter, is fitted to the top of the space-

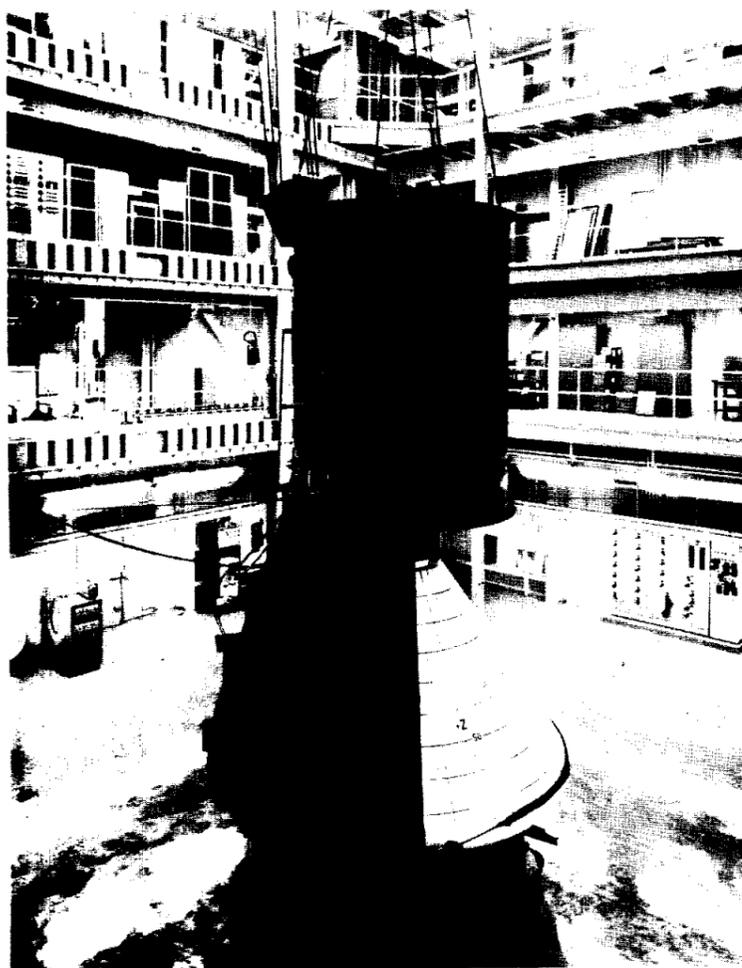
craft shroud where a portion of the sound is absorbed.

Even with the muffler on, the system generates a sound like a continuous roll of thunder, a rocket engine starting, or a jet aircraft—a noise which can be heard several hundred yards away from the building.

Producing all this sound is the second largest horsepower

motor at MSC which runs a compressor pulling 24,000 cubic feet of air through the system every minute of operation.

For its first tests, the sound system will be run at low volume to check out the fit of the shroud over the spacecraft. Then full volume tests will determine whether the Apollo spacecraft can withstand the dynamic loading on a lift-off for the moon.



THUNDERHALL—Noise on a wholesale basis will be produced in the Acoustics Laboratory by this device shown in place over an Apollo command module boilerplate. One of 16 fiberglass horns is mounted on the shroud which directs high-level noise against spacecraft to determine their reactions to launch vehicle noise and exit velocities.

Switch LEM Contract To Cost-Plus-Incentive

NASA has announced conversion of another of its major contracts from a cost-plus-fixed-fee type to a cost-plus-incentive agreement.

Combinations Belong In Memory Core, Not in Jotted Notes

Everyone has heard the bewhiskered story of the employee who couldn't remember the combination to a safe, and jotted it down on a slip of paper and kept it taped to the side of the safe.

While obviously no one at MSC would pull such a stunt, Security Branch reminds all employees that "records of combinations, if made, shall be classified no lower than Secret, and such records must be marked and stored accordingly."

Security points out that such records of combinations are to be made only when the number of combinations involved makes it impractical for one to memorize them.

But assuming it is absolutely necessary to keep a typed record of combinations, the typewriter ribbon used in its typing must be cut off and destroyed as Secret waste—not placed in the Confidential waste container. Possession of a written combination in a desk, wallet or purse is also *verboten*; such written combinations must be destroyed or properly stored in the manner described above.

To avoid any chance of compromising safe combinations, memorization is the best answer. But if all the numbers get scrambled some Monday morning after an active weekend, Security Branch has a record of all combinations at MSC and can provide the service of opening security files or safes.

The contract, with the Grumman Aircraft Engineering Corporation, Bethpage, New York, is for development of the Lunar Excursion Module for NASA's Apollo Program.

Under terms of the new four-year contract, Grumman will deliver 15 flight articles, 10 test articles and two mission simulators. The period of the contract, ending December 31, 1969, is for the total run of the LEM development program. Target cost is \$877 million.

The contract provides profit incentive for outstanding performance, cost control and timely delivery as well as potential profit reductions when performance, cost and schedule requirements are not met.

Grumman was selected by NASA in January 1963 to develop the LEM. Cost of the work, including the new agreement, is \$1.3 billion.

This conversion marks the second such major contract conversion by NASA within the past two months. The agency announced January 21 that it had signed a contract conversion with North American Aviation for development of the Apollo Command and Service Modules. That contract conversion was in the amount of \$671,300,000, and covered a one year period ending in December this year. Total cost of the NAA contract is \$2.2 billion.

A unique incentive technique is included in both the North American and Grumman contracts. Called the "Planned Interdependency Incentive Method," the technique brings together the incentive parameters, cost, technical performance and schedule so that the incentive fee is earned or lost on the basis of the combined results of these parameters.

Both spacecraft development contracts are managed by MSC.



ARE THE TAME CATS IN CHARGE?

Omens of Orwell

(Reprinted courtesy of the *Saturday Review*, from the January 1 1966 issue.)

By Philip Abelson

Editor, *Science*

Journal of the American Association
for the Advancement of Science

SCIENCE and technology have made outstanding contributions to the dynamic success of the United States as a world leader. We are able to maintain a position of prestige and influence on the international scene because we can devote large sums to foreign aid and to the support of military forces abroad. Even now we have some problems with the gold drain and with balance of payments, but the situation would be completely impossible were it not for our strength in producing products derived from intensive laboratory research. The value of our exports of synthetic fibers and goods made from them, and of chemicals and related products, runs four to five times the worth of corresponding imports.

But our world position is by no means guaranteed. We attained our present status in part through circumstance. While our scientific establishment thrived during World War II, our principal competitors were suffering tremendous losses. For many years after World War II, Germany, Japan, and Russia were preoccupied with restoring their physical plants. Only during the last ten years have they been able to devote serious efforts to catching up with us. At present the progress of the Japanese is particularly impressive, but other nations are on the move. Practically all Western countries are now seeking to improve their national effectiveness in exploiting science. They display keen awareness of the role of science and technology as an agent of progress and prosperity. They are intent on establishing national policies that will increase their ability to compete with us. We can no longer count on being one of the few nations pushing science as an agent of national welfare. We are certain to face much tougher competition in the future.

I am not optimistic about our ability to remain on top. I say this because the quality of our decisions with respect to science has deteriorated. Too large a fraction of our research and development funds are being spent by government in ways that do not help our competitive position or benefit society.

The federal government is now spending more than \$15 billion annually on research and development. Of this, about \$7 billion goes to defense, \$5 billion to exploration of extraterrestrial space; out of the remainder, only a small fraction goes to efforts

likely to help the civilian economy directly. We are not getting an adequate return on much of the money being spent.

WHAT have we got for the \$21 billion we have spent up to now on the exploration of space?

The unmanned satellites and other spaceships, which have cost a few per cent of the total expenditure, have yielded almost all the important advances. They have, for example, revealed the Van Allen radiation belts, determined more precisely the shape of the earth, and provided us with information about global weather. They have measured the solar wind and its influence on the earth's magnetic field. Rocket astronomy has permitted us to detect X-rays from the sun and stars.

Growing out of the unmanned effort are a number of practical applications. Commercial success of the communications satellites seems likely. The transit satellite is another successful unmanned vehicle; it is an aid to navigation, helpful to civilian as well as military needs.

The value of spy satellites can only be guessed, for little has been said about them. We can be sure, however, that very good photographs could be obtained of both the Soviet Union and mainland China. To gauge their potential quality we need only recall the pictures from Ranger 9, transmitted 240,000 miles from the moon. As it is much easier to place heavy equipment in the earth's orbit than to send it to the moon, a spy satellite could surely have far more sensitive cameras than those of Ranger 9.

From the manned space program we have had very little indeed. Some military technological fallout is associated with it. Development of huge booster rockets for the program also provides knowledge and technology for much larger intercontinental ballistic missiles. However, there have been practically no worthwhile civilian benefits. The requirements of a man in space are the requirements of what for most of us will remain an unnatural environment.

The moon is like a ghastly battlefield — lifeless, pock-marked with numberless large and small craters. The astronauts will find no comfort there. They must take all their needs with them: food, air, water. The temperature will change from sizzling heat during the day to intense cold at night. If some failure should prevent their return to earth, they would be doomed. If they return, they will bring with them specimens of

some scientific interest but no economic value except as curiosities—or even the specimens may prove disappointing. We may find that the materials on the moon differ little from the meteorites. We may discover that we have spent billions to obtain specimens such as nature already delivers to earth free of charge.

EARLIER, I mentioned some of the contributions that science and technology have made to society and noted how our whole way of life is governed by such contributions. The total cost of the basic research that made those contributions possible was perhaps \$10 billion, less than half the \$21 billion already spent by the National Aeronautics and Space Administration.

To provide a more specific illustration, I would remind you of our atomic energy program as it stood in December 1942. At that time, we had an operating nuclear reactor and had established the foundations for the atomic power industry of the future. We had proved the feasibility of the atomic bomb. We had discovered how to make and use the radioactive isotopes that are so valuable in chemical and medical research. The total cost was less than \$20 million, perhaps as little as \$10 million. The revolutionizing information so acquired is of much greater significance than anything we have obtained, at a thousand times the cost, from our space effort. Indeed, it might be said that the most remarkable result of space exploration is the federal government's discovery of a way to spend enormous sums of money on research and development without getting great benefits in return.

I shall turn next to high-energy physics. The situation in this field illustrates further our failure to establish a suitable apparatus for decision-making with respect to science.

Before 1945, the largest high-energy machine was a cyclotron at Berkeley. Together with building and associated laboratory facilities, the installation cost a little more than \$1 million dollars. During World War II this cyclotron contributed to the atomic bomb effort.

Following the developments of World War II, many segments of government were eager to support research in nuclear physics. A series of new machines of successively higher energy were designed and built, costing increasing sums of money. Our current annual expenditures are about \$100 million. From 1945 to 1965 about a billion dollars was expended in this field. Moreover, high-energy physics has absorbed some of the best brains of this nation. Studies have shown that physics can be mastered only by men of the very highest intelligence, and half of our physicists have been occupied with high-energy nuclear physics. As a result, Americans received a number of Nobel prizes. However, no results of practical value were obtained.

I repeat, no results of practical value were obtained. Never,

Looking Over a Three-Leaf Clover



NON-DESTRUCTIVE BOMBING—A developmental clover-leaf configured 56-foot diameter parachute is shown in the first in a series of 15 test drops at the Aerospace Recovery Facility, El Centro, Calif. January 26. The 5000-pound "bomb" used in the test was dropped from a B-66 at an altitude of 6000 feet. Landing Technology Branch of Structures and Mechanics Division is evaluating the Northrop-built steerable parachute as a possible land landing system for future spacecraft.

in the history of science, have so many fine minds been supported on such a grand scale, and worked so diligently, and returned so little to society for its patronage.

In the face of this record the Atomic Energy Commission, the Joint Committee on Atomic Energy of Congress, and the Office of the President seem agreed that an even more costly installation is to be built. At the moment, the government is in process of making what amounts to a billion-dollar decision with respect to the location of a new 200-billion-electron-volt high-energy machine. Initially, the installation will cost \$300 million, and its annual upkeep will amount to \$80 million. If built, it will surely be operated for ten years.

The Atomic Energy Commission has asked that interested groups submit proposals outlining their interests and their ability to meet site criteria. As a consequence 126 proposals have been received representing almost every state in the United States. The proposals involved a considerable amount of technical detail. Some were several inches thick. I have been told that one Texas city spent \$6 million in preparing its brochure. After nearly six months' study the Atomic Energy Commission narrowed the field from 126 to eighty-five and then tossed the problem to a special committee of the National Academy of Sciences.

In all the excitement, no one seems to give any weight to the dim prospects for any kind of reasonable payoff to society.

Most high-energy physicists will admit that the past twenty years have been barren of direct practical benefits. During the last eight years even the philosophic impact of high-energy physics has been limited. Robert Oppenheimer recently touched on this in an address at celebration of the bicentennial of the Smithsonian Institution. Speaking of the impact of discoveries in physics, and particularly in nuclear physics, he said:

"It has seemed clear that unless the discoveries could be made intelligible they would hardly revolutionize human attitudes. But it has also seemed likely that unless they seemed relevant to some movement of the human spirit characteristic of the day, they would hardly move the human heart or deflect the philosopher's pen. Five centuries ago the errors that physics and astronomy and mathematics were beginning to reveal were errors common to the thought, the doctrine, the very form and hope of European culture. When they were revealed, the thought of Europe was altered. The errors that relativity and quantum theory have corrected were physicists' errors, shared a little, of course, by our colleagues in related subjects. A recent vivid example is the discovery of the non-conservation of parity. The error which this corrected was limited to a very small part of mankind."

Now we are on the threshold authorizing what amounts to a billion dollars or more for a new machine. By this act we will please a few thousand physicists. We will subsidize some of our

very best brains to withdraw from society to engage in an activity having little prospect of practical or philosophic value.

WHO is to be blamed?

In this instance, I should put about half the responsibility on the physicists. The major responsibility, however, must rest with the government, which has the authority to make decisions. The government, if it will, can tap the advice of the best brains of the nation. As it happens, the AEC has principally asked for the opinions of high-energy physicists. This is, of course, like asking a hungry cat to make recommendations about the disposition of some cream.

The uneven quality of federal judgment with respect to science is further illustrated by the niggardly level of federal support for basic research in chemistry. Advances in most sciences are dependent on superior chemical techniques and on new fundamental understanding of matter and its reactions. Chemistry is central to many fields, including biochemistry, molecular biology, neurochemistry, and solid-state physics. There are comparatively few products that meet man's urgent needs that do not involve chemistry. Food, clothing, shelter, medicine, transportation, and recreation involve this science at every turn.

Our chemical industry itself is one of this country's greatest assets, being responsible for creating an annual output worth \$36 billion. Since chemicals enter into many other products, chemistry's contribution to the gross national product could approach \$100 billion. Chemical and pharmaceutical industries annually contribute about \$1.5 billion toward helping our balance of payments and lessening the gold drain.

In the long run, the strongest nation will be the one that applies chemistry most effectively. The long-range interests of this nation require a strong chemical profession, and basic to it are strong chemistry departments in the universities. Yet, while NASA was receiving an annual \$5 billion, a sum that represented almost all the money asked by the agency, chemistry received only a small fraction of its requests. The National Science Foundation, for example, gave grants in chemistry for only 17 per cent of the dollars requested. In total, chemistry received from all federal sources \$60 million. In my estimation, chemistry, for the long haul, is ten to 100 times as important as space, yet it receives only about 1 per cent as much money.

The fundamental problem is that we have not faced up to the necessity of making rational judgments in the choice of major projects. We have good mechanisms for making judgments involving small lumps of money—that is, grants by the National Science Foundation, or by the National Institutes of Health. Allocation of the larger sums, however, is the primary responsibility of politicians. Politicians, enamored of headline-catching spectacles, are disposed to support the spectacles and get

their names associated with them. Research projects involving only a few thousand dollars fill them with antipathy. If the project is important, why doesn't it cost more? Politicians pay some lip service to basic research, but they support it only grudgingly. There is little political currency connected with it. What kind of newspaper notice attends award of a \$5,000 research grant?

Our decision to send a man to the moon was a political decision occasioned by the Bay of Pigs fiasco. The decision was made in haste and after essentially no consultation with the scientific community. The annual \$5 billion that goes to NASA is ramrodded through Congress on a no-nonsense basis.

In most years, only captive witnesses are heard by the Senate and House space committees. There are some cozy hearings in which NASA employees or consultants laud the space effort and present their package. I am aware of only once when a witness known to be hostile was asked to testify. On that occasion, a whole battery of NASA consultants were called on to discount the single opposition voice.

In 1964 the \$5 billion space budget was passed without one dissenting voice from the scientific community. About that time I conducted a poll of readers of *Science* asking their views on the relative importance of space research. An overwhelming majority gave it a low rating.

There are several reasons why scientists do not seek to testify at hearings on research and development legislation. Most scientists are unaware of the schedule of impending hearings and unfamiliar with mechanisms for obtaining an audience. Only a limited number feel competent to make judgments in diverse, highly technical areas. With few exceptions, there are no staffs to aid in preparation of material.

Only when highly emotional issues, such as nuclear bomb fallout, are involved is there a semblance of broad response.

A major reason why research and development legislation is not more adequately discussed is a lack of evident immediate clash of self-interest among scientists. The self-interest of those who advocate expenditures is obvious; but who makes the probing counter-argument? At present, it comes not from informed witnesses but from congressmen, whose principal, well-worn line is that we are spending too much money on science in general.

Failure of scientists to criticize publicly, to any appreciable degree, programs many deem ill-judged often stems from analysis of the balance sheet of their own self-interest. On the positive side is the consideration that the long-term interest of their profession and the nation dictates that unwise expenditures not be made. If the public loses confidence in the integrity of scientists, the sequel could be calamitous for all. But this nebulous possibility does not outweigh present realities. The witness who questions the wisdom of the establishment pays a price and incurs hazards. He is diverted from his professional activities. He stirs the enmity of powerful foes. He fears that reprisals may extend beyond him and his institution. Perhaps he fears shadows, but in a day when almost all research institutions are highly dependent on federal funds, prudence seems to dictate silence.

I have personally appeared before congressional committees on three occasions. The experiences did not increase my appetite for additional opportunities. Each time, I went to considerable effort to prepare my presentation. On the first occasion Edward Teller was among the witnesses. Indeed, he was the lead-off speaker. When his testi-

STAR-SPANGLED SAVINGS PLAN FOR ALL AMERICANS U.S. SAVINGS BONDS

mony was completed, congressmen swarmed around, having their pictures taken with him. The press clustered about, firing questions. When Professor Teller left, almost all the congressmen and the press vanished. The testimony of subsequent witnesses had as much substance as that of Teller, but their voices echoed in an empty room.

On the other two occasions, I told the committees some truths they did not wish to hear. As a consequence I learned some facts of political life the hard way. After formal presentations the congressmen are free to question witnesses. In this period they enjoy several advantages. First, many are by training lawyers, who like to build traps for the unwary witness. Second, they have the help of staff members who unobtrusively slip them tough questions. Third, when the witness seems to be making a point, they can cut him off or suddenly ask a tangential question.

Even though I did not suffer from my three experiences, I was left with the feeling that I had wasted my time. If I have something to say, I find it more effective to use other means of communication, such as an editorial in *Science*. As matters exist now, few scientists have a platform of comparable quality. With rare exceptions, only the Tame Cat scientists are heard.

If we are ever to achieve a sound policy for science, we must find a way to permit better public discussion of scientific issues. This reform should include freeing the witness from fear of reprisals. It should also

provide that well-considered presentations be given a hearing. To achieve these objectives would probably require the creation of new institutions. For instance, the National Association of State Universities and Land Grant Colleges might sponsor a science policy institute having some full-time and many part-time participants and including men trained in the social sciences. When such a group had hammered out a well-considered report, it would receive broad, respectful attention. Not many congressmen would attack such a group.

Achieving a sensible allocation of federal funds for research is an important problem that society must solve in order to deal with the scientific revolution. The record of predictions made concerning science and technology has been one of consistent underestimate. But part of the future can be inferred by examining present trends.

I believe that the potential for discovery or revolutionary knowledge is great in biology—greater even than in the physical sciences. The tools and the concepts of physics and chemistry will, of course, have important roles in the new findings.

SINCE no one knows what the new discoveries will be, it is impossible to outline the practical consequences. Therefore, I will use a sort of poetic license here to sketch briefly two possibilities. Some new experiments indicate that man may find himself in a position to deliberately change the genetic content of developing embryos, possibly for the better. Suppose that the biosciences succeeded in developing a fetal therapy such that the I.Q. of a person could be raised, say, ten to twenty points. Think what that would mean! A nation that employed it would automatically attain an intellectual advantage.

As another example, consider the possibilities inherent in perfection of a memory-sharpening drug. It is not impossible. Once we understand the mechanism of data storage and retrieval in the human brain, we may be able to develop therapeutic aids. The achievement of such possibilities would give man greater power to control his future. It would also demand far more wisdom than man has so far seemed able to supply.

If the knowledge and power of science are wisely used, a golden age of humanity can be achieved and maintained. But it is by no means guaranteed. Man cannot escape the need for decisions. Even the refusal to make judgments and take action is itself a decision.

Who will make the decisions? Will it be a broadly informed electorate? Or will it be a narrow oligarchy at the seat of highly centralized power? My feeling is that we are much closer to George Orwell's 1984 than most people realize. In fact, we are about on schedule in arriving there. We can avoid this catastrophe only if we achieve a greater sense of responsibility in our decision-making.

Conciliatory Visitors



MEDIATION EXPERTS—Three members of the Federal Mediation and Conciliation Service receive a short course in space flight from MSC Deputy Director George M. Low, center, during their January 12 visit to MSC. Left to right are MSC Deputy Assistant Director for Administration Philip H. Whitbeck, FMCS Deputy Director Robert H. Moore, FMCS Director William E. Simkin, Low, MSC Labor Relations Officer Bailey R. Chaney, and Houston FMCS Commissioner Willis R. Ray.

Public Schools Only As Good As Their Support By Parents

The week of March 7 to 11 has been proclaimed Public Schools Week in Texas—a week in which parents and all other citizens have the opportunity to witness first hand the work that is being done to shape the minds of their children in the public school system.

Problems of expanding school facilities to meet the so-called population explosion and of making the teaching profession more attractive are the problems of every citizen, whether or not he now has children in school.

When approached by a local Public Schools Week committee member or P-TA member to take

part in school visits and other facets of Public Schools Week, it is perhaps too easy for one to find an out—a social engagement, or even sheer reluctance to break away from the TV set. Public schools, by definition, belong to the public.

The maxim "We get the kind of government we deserve," can well be paraphrased to say, "Our children get the kind of education they deserve" . . . if we, as parents and citizen school-taxpayers, take an active interest in the functioning of public school systems, not just during Public Schools Week, but the year around.

Investment Forum To Be Held Monday Night

MSC employees who would like to put their money to work are invited to a stock forum Monday night at which pointers in making investments will be given.

Francis P. Burke of the Houston office of Merrill Lynch, Pierce, Fenner & Smith will be the featured speaker. The forum will be at the King's Inn at 8 pm. Burke's topic is "The Economic and Market Outlook."

If enough interest is shown in the first forum session, it is planned to follow it up with a four-session investment seminar in the NASA-Clear Lake area.

Trouble Awaits Drivers Who Pass On Right Shoulder

No matter how impatient a driver gets or how tempting it looks to pass on the right shoulder a car waiting to make a left turn, under Texas law it is illegal to make such a move.

Perhaps the spot most encountered by MSC people driving to work is on State Highway 3 at the Clear Lake City turn-off. While a lot of drivers swing over onto the shell shoulder to pass on the right when traffic stacks up waiting for someone to turn left, anyone doing so risks a heavy fine; the shoulder simply is not a passing lane.

State Highway 3 construction will likely continue through most of 1966 and will make for hazardous driving conditions. Caution and perhaps even a little of that rarity called courtesy will go a long way toward heading off a nasty accident that will delay someone getting to work longer than just a few minutes.

The SPACE NEWS ROUNDUP, an official publication of the Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Texas, is published for MSC personnel by the Public Affairs Office.

Director Dr. Robert R. Gilruth
 Public Affairs Officer Paul Haney
 Editor Terry White
 Staff Photographer A. "Pat" Patnesky

Space News Of Five Years Ago

Feb. 21, 1961 — Mercury-Atlas 2 was launched from Cape Canaveral in a test to check maximum heating and its effects during the worst reentry design conditions. The flight closely matched the desired trajectory and attained a maximum altitude of 114.04 statute miles and a range of 1,431.6 statute miles. Inspection of the spacecraft abroad the recovery ship some 55 minutes after launch (actual flight time was 17.56 minutes) indicated that test objectives were met, since the structure and heat protection elements appeared to be in excellent condition. The flight control team obtained satisfactory data; and complete launch computing and display system, operating for the first time in a flight, performed satisfactorily.

Astronauts John Glenn, Virgil Grissom and Alan Shepard were selected by the Space Task Group to begin special training for the first manned Mercury flight.

Feb. 23, 1961 — NASA Administrator James E. Webb and Deputy Secretary of Defense Roswell Gilpatrick signed letter of understanding confirming the national launch vehicle program, the integrated development and

procurement of space boosters by NASA and DOD. It was agreed that neither DOD nor NASA would initiate the development of a launch vehicle or booster for use in space without written acknowledgement of the other agency.

Feb. 24, 1961 — Spacecraft No. 9 was delivered to Cape Canaveral for the Mercury-Atlas 5 orbital primate (Enos) mission.

Feb. 28, 1961 — NASA Administrator James E. Webb stated that President Kennedy has ordered a thorough review of the Nation's space program.

During February: Instruction was provided to the astronauts to develop techniques and procedures for using the personal parachute as an additional safety feature in the Mercury program. This parachute was only used during the Mercury-Redstone 3 mission manned by Alan Shepard.

Mar. 2, 1961 — Evaluation of the Mercury-Atlas 2 flight disclosed that the spacecraft afterbody temperatures were somewhat lower than had been anticipated.

Tass announced that radio contact with the Soviet Venus probe could not be established on February 27.

OUT OF TEXAS' PAST—

Texas' Independence Declaration Second In Impact

Texas, the only continental state that once was an independent nation, with her own army, navy, currency and diplomatic corps, also is the only state with its own independence day. We observe March 2 as the anniversary of the day 130 years ago when Texas declared her independence from Mexico.

The formalities took place at Washington-on-the-Brazos, 100 road miles from Clear Lake, in a building now restored, in the leap year of 1836. We are told that the weather that day was cold, a wet norther having come howling down the valley of the Brazos on the 29th.

But in Davis' Saloon, on Ferry Street, George Childress and his committee were revising the second hottest document ever written in this hemisphere. We say revising because there is little doubt that George wrote the first draft back in his home municipality of Milam and brought it to Washington in a saddlebag.

We call it the second most incendiary document because the Texas Declaration of Independence is next in historic impact to the United States Declaration of Independence.

The document signed at Philadelphia on July 4, 1776, established 13 states with an area of about 400,000 square miles—only about half of it settled.

The instrument signed at Washington-on-the-Brazos on

March 2, 1836, established another great constitutional republic in North America, one claiming territory embracing present Texas plus parts of New Mexico, Oklahoma, Kansas, Colorado and Wyoming—just about another 400,000 miles, all of it clearly destined, even then, to become a part of the United States.

There can be little doubt that George Childress used a copy of the United States Declaration of Independence as an inspiration for the one he drew up for Texas. Most likely he and the other members of the committee had copies of the American document beside them when they revised Childress' original.

Lay these two immortal documents side by side and compare them. The texts are dissimilar. But they have the same length almost to the word-count, that is a bit over 1300 words.

The United States Declaration was signed by 56 delegates; the Texas Declaration by 59.

Both Declarations begin with the word *When*. Each has its preamble, then its list of colonial grievances. In each, the declaration proper begins, *We therefore . . .* Both use such phrases as *a candid world*, and both conclude with prayers for divine guidance.

The United States Declaration is a masterpiece of unequivocal political idealism. The Texas Declaration is a masterpiece of simplicity, clarity and

realistic devotion to fundamental American principles.

Finally, each of these great American instruments was mainly the work of one inspired Southerner. For Thomas Jefferson was a Virginian. George Childress has immigrated to Texas from Tennessee.

The elected convention delegates were bickering when Childress and his committee brought their Declaration from Davis' over to the unfinished frame building that Noah Byars and Pete Mercer had built for a combination blacksmith shop and gunshop. The norther was whistling through the open doorways and unframed windows. It was the birthday of one of the half-frozen, buckskin-clad delegates: Sam Houston was 43, so advanced in years that everybody called him "Old Sam."

The bickering was over policy. And no wonder. The military situation was so bad that nobody knew what to do—not even Houston.

The Alamo was under bombardment by the forces of the tyrant Santa Anna. Colonel Travis had written his heroic letter ending, "God and Texas—Victory or Death!" Half the delegates felt they ought to ride to Travis' aid. The other half were for fleeing to the Louisiana border.

It was the second week of Lent, and Texas was doing a terrible penance. Unknown to

the convention, 32 men from Gonzales were riding to San Antonio. But they were doomed, like all of Travis' command. Jim Fannin's outfit was to be massacred on Palm Sunday. And the heartbreaking Runaway Scrape was about to begin on the scorched earth of Texas.

But the political climate of the convention changed when the declaration committee filed into the crowded little gunshop: Childress; Collin McKinney, from Pecan Point; Ed Conrad, from Refugio; Jim Gaines, from the Sabine; and Bailey Hardeman, from Matagorda. The presiding officer, Judge Dick Ellis, from Pecan Point, asked George if he and his committee had finished their job.

George said they had, and read the manuscript.

When a government has ceased to protect the lives, liberty and property of the people from whom its legitimate powers are derived . . . the first law of nature . . . enjoins it as a sacred obligation . . . to abolish such government and create another, calculating to rescue them from impending dangers and to secure their future welfare and happiness . . .

When George had finished reading, the delegates cheered themselves hoarse. The citizens of Washington looking in from the outside fired off their small arms. Several horses ran away, and a drunk at Davis' crawled

behind the bar, supposing that Santa Anna was attacking the town.

Sam Houston moved that the Declaration be adopted without amendment, and the motion passed by noisy acclamation.

The liberation of Texas, which followed the pronouncements at Washington-on-the-Brazos, was accomplished by as nobly American a campaign as any led by Washington or his generals.

But Texas pressed her war of liberation forward with far greater speed and with far more spectacular success than the 13 original states did theirs. It was 1781 before Cornwallis surrendered. And the Treaty of Paris was not signed until September of 1783—more than six years after they rang the Liberty Bell.

But Texas declared herself free on March 2, 1836; and on the 21st day of the following month the sadly equipped Texas army (led by "Old Sam" Houston) met and destroyed a superior force commanded by the Mexican dictator himself. And on May 14 the Lone Star Republic entered into a treaty with the enemy that guaranteed Texas' independence—all within two and a half months after the first delegate to the convention at Washington-on-the-Brazos signed his John Hancock—oops!—signed his Richard Ellis—to the second great American Declaration of Independence.

Lunarfins Teach Scuba Course; Begins March 8

A certified course in the use of self-contained underwater breathing apparatus (SCUBA) will begin March 8 sponsored by the MSC Lunarfins skin and Scuba diving club. Technical diving information as well as supervised practical experience in the use of Scuba gear will be offered in the course.

Lunarfins members recently learned of a new phase of sport diving when at this month's meeting a representative of an airline described the airline's newly-formed flying skin divers club. Charter flights to diving areas in the Bahamas and Florida Keys are now offered by various airlines.

Other guest speakers at the monthly Lunarfins meeting exhibited several types of underwater camera cases and showed underwater movies taken in the Gulf of Mexico near Tampico, Mex.

MSC employees having the yen to become a disciple of Captain Costeau and discover the thrills of underwater exploration, photography and spearfishing are invited to attend Lunarfins monthly meetings. Call Jim Peacock at Ext. 2557 for additional details about the course offered and about other Lunarfins activities.

MSC BOWLING ROUNDUP

MIMOSA MEN'S LEAGUE

Standings as of February 10

TEAM	WON	LOST
Green Giants	26 1/2	9 1/2
Chizzlers	24	12
Whirlwinds	22	14
Foul Five	20	16
Agitators	20	16
Alley Oops	17	19
Road Runners	14	22
Goobers	14	22
Technics	12 1/2	23 1/2
Fabricators	10	26

High Game: B. Graham 273, G. Amason 266.

High Series: G. Amason 701, B. Harris 701.

High Team Game: Whirlwinds 1108, Alley Oops 1105.

High Team Series: Chizzlers 3138, Technics 3093.

MSC 5 O'CLOCK MONDAY MIXED LEAGUE

Standings as of February 7

TEAM	WON	LOST
Pacesetters	44 1/2	27 1/2
Pot-Shots	37 1/2	34 1/2
McH's	36	36
Hi-Hopes	34	38
Thirds	32	40
Bombers	32	40

High Game Women: Tommie Bordeaux 193, Blanche Henderson 192.

High Game Men: E. Ray Walker 246, Harley Erickson 223.

High Series Women: Gale Mauney 483, Sharon Brenan 482.

High Series Men: Harley Erickson 604, E. Ray Walker 585.

EMPLOYEE NEWS

EAA Club Meeting Schedule

The arts, crafts and clubs listed below are sponsored by the Employees Activities Association and are open to all MSC employees, their families and MSC contractor employees. Contact the groups of your interest or Hugh Scott, Ext. 2557 for additional information.

CLUB	CONTACT	PHONE NO.	MEETING TIME
Barber Shop Quartet	Bill Crews	5486	Every Thurs. 7:30 pm, Bldg. 1
Bridge	John Herrmann	3031	Every Tues. 7:15 pm, Bldg. 336 EAFB
Charm	Judy Liles	3661	To be announced
Dance Band	R. P. Kehl	4801	To be announced
Flying	Dr. John Zieglschmid	5333	2nd Tues. Each month Bldg. 6
Great Books	Marvin Matthews	7365	Every Other Tues. 8 pm, Clear Lake City Community Center
Ham Radio	Norman E. Boles	4711	To be announced
Judo	Don Bray	2801	Each Tues. and Thurs. 5:30 pm, Clear Lake City Community Center
Radio Control	Bill McCarty	5411	1st Wed. each month. 5:00 pm, Bldg. 4, Rm 278
Airplane			3rd Weds. each month.
Scuba Diving	Chet McCollough	2743	7:30 pm, Bldg. 336 EAFB
Singleton	Arminta Yanez	7771	To be announced
Toastmasters	Dick Wieland	3021	1st and 3rd Wed. of each month. Kings Inn, 6:00 pm.

1965-66 MSC/Ellington AFB Basketball League

Final Standings

	Won	Lost	Percent
American Division			
MPAD Gunners	8	0	1.000
Coast Guard	7	1	.875
Grasshoppers	6	2	.750
ASTD Lonestars	4	4	.500
Guidance & Control	3	5	.375
747th Rams	2	6	.250
IESD	2	6	.250
ASPO	2	6	.250
2103rd Comm Sqdn	2	6	.250
National Division			
IBM	8	0	1.000
General Electric	7	1	.875
AV Corporation	5	3	.625
FCD	5	3	.625
Propulsion & Power	4	4	.500
Phileo	3	5	.375
Univac	3	5	.375
ANG	1	7	.125
TSD	0	8	.000

DELEGATING RESPONSIBILITY—

Parents Must Screen Sitters Like Any Other Job Seeker

(Part of a continuing series on driving, home and job safety by the MSC Safety Office.)

Everyone likes to occasionally break free of home ties, say on a Saturday night, leave the tads in charge of a baby sitter, and unwind for a few hours at the theater, in a nightclub or restaurant.

In taking these brief interludes away from the small members of the family, parents delegate to baby sitters a larger responsibility than they realize, and for this reason, choice of a baby sitter should be a studied action. In the United States there are more than 60 million babies and an estimated 30 million people in the baby sitting business—either part-time or full-time.

Except for some granny-types, most of the people who sit are teen-agers, but whatever the age, there are certain qualities to look for in choosing a baby sitter:

- The ideal baby sitter
- thinks clearly and takes proper action in an emergency.
- has adequate experience and knows what to do when,

Volleyball Group Meets

A league meeting for men's and women's volleyball teams will be held Wednesday, February 23 at the Ellington AFB NCO Club at 7 pm.

Team managers or assistant managers should enter their teams in the league through Dave Mullins, Ext. 4521.

- has the will power to make the kids obey.

- has a good sense of humor and likes children while commanding their respect.

- has a pleasant personality and does not gossip, and

- is alert and has a working knowledge of first aid.

When the sitter first reports for duty, the parents should thoroughly brief the sitter on such things as:

- locations of medical supplies, bed clothes, outside exits, flashlights, fire extinguishers, master switches and valves for utilities.

- children's fears or problems, eating habits, bedtime schedule, medications and allergies.

- what to do for the dogs, cats and parakeets.

- where parents can be reached by telephone, (leave instructions in writing) and

- location of a prepared list of telephone numbers of the doctor, hospital, police and fire departments, a nearby neighbor or relative.

Parents should stress to the sitter that in case of a fire in the home the children and the sitter should first get out, and then call the fire department and the parents—in that order.

Choice of a baby sitter should be made carefully, for in leaving children in the care of a sitter, parents delegate responsibility for their most precious possessions.

EAA Schedules Ice Skating Party For Small Fry

Offspring of MSC employees who like to make like Hans Brinker will have the opportunity Sunday February 27 to demonstrate their prowess on the ice.

An ice skating party for MSC youngsters, sponsored by the Employee Activities Association, has been scheduled from 1 to 3 pm at the Winterland Ice Rink at 2400 Norfolk in Houston (one block east of Kirby and Richmond.) Children of all ages are invited, but those under 10 must be accompanied by one or both parents.

EAA District Representatives have tickets to the skating party at \$.50 per person. Admission includes skate rental and refreshments. Hamburgers, soft drinks, coffee and doughnuts will be served at the party.

Children and parents attending the party have the option of driving directly to the skating rink or of rendezvousing at the SAGE parking lot, 9555 Gulf Freeway (Exit 13), to board buses at 12:15 pm. The buses will return to the SAGE lot at approximately 4:45 pm.

Sandra Burdsal, Ext. 5554 or Flora Byars, Ext. 4535 can furnish additional information on the skating party.

Flight Ops Service Awards



TOTAL 130 MAN/YEARS SERVICE—Two Twenty-five Year and four Twenty Years Service Awards were presented recently in the Flight Operation Directorate. Twenty year certificates and pins are presented by Christopher C. Kraft, Jr. Assistant Director for Flight Operations, left, to Clyde E. Middleton, Flight Control Division; Oral E. Smithwick, Robert F. Thompson and Edward B. Petrash, all of Landing and Recovery Division. The two Twenty-five Year Award recipients (inset) are William C. Scott, Landing and Recovery Division, and James R. McCown, Flight Support Division.

Space News ROUNDUP!

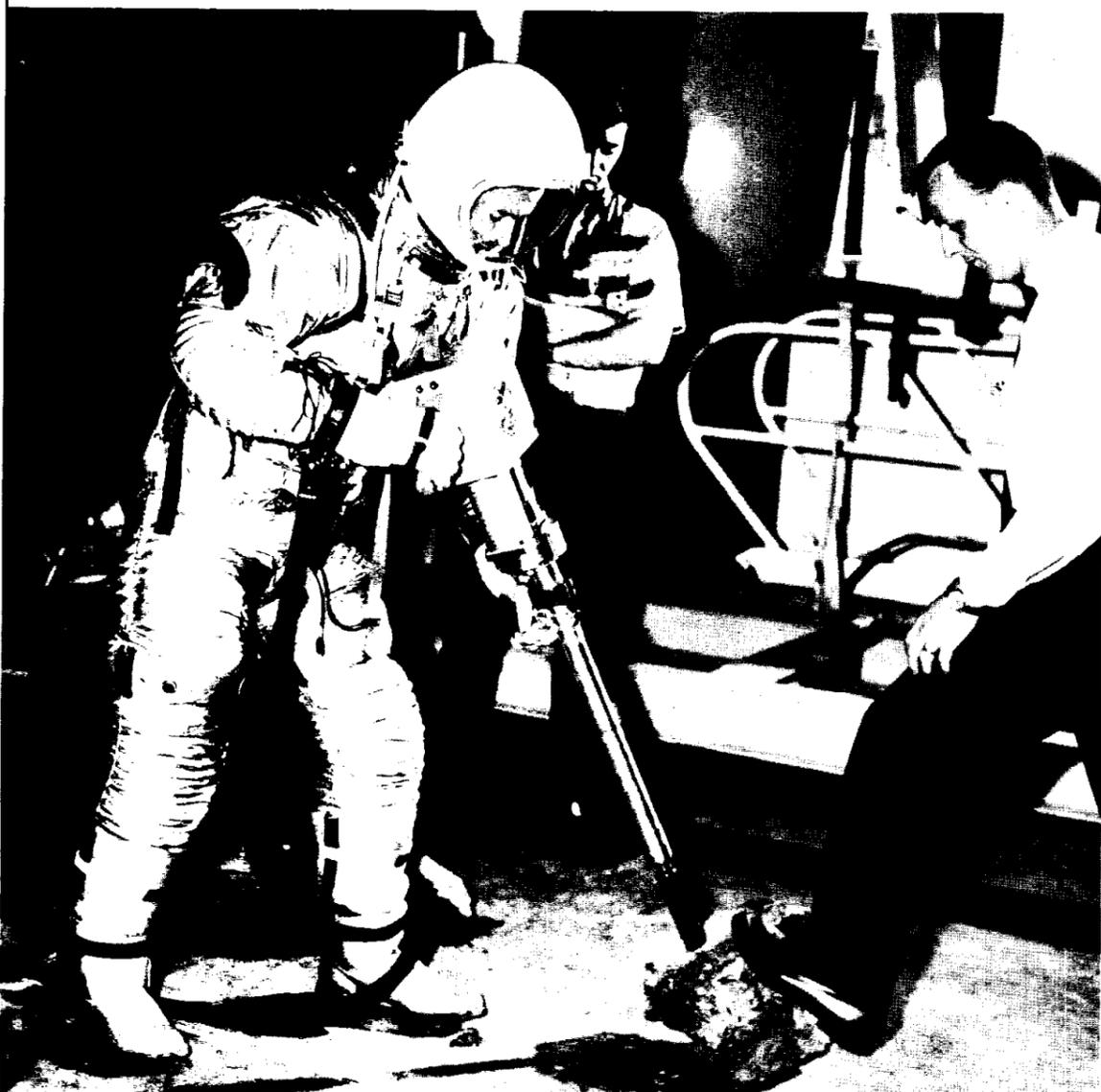
SECOND FRONT PAGE

It's 'Go Texan' Time Again



THE TIE THAT BINDS—Squinting into a tiny mirror held by Sandy Cook, Henry E. "Pete" Clements, chief of Flight Support Division, adjusts a "Go Texan" string tie plugging the 1966 Houston Livestock Show and Rodeo February 23-March 6 at the Astrodome. Ticket requests to the Show and Rodeo are available at the King's Inn. A salute to the MSC area will be made at the February 23 evening show and to MSC families at the February 27 matinee. Marking ticket orders "NASA area" will insure seating in a section of the Astrodome set aside for Clear Lake area people on these dates.

Lunar Drilling Drill



MOON BORER—A battery-powered lunar core drill, part of the prototype lunar geology tool box under evaluation at MSC, (See February 4 Roundup) gets a workout in Building 7 from Uel Clanton of the Lunar Surface Technology Branch of Advanced Spacecraft Technology Division. The dual-purpose tool and sample-return storage box was developed by the Martin Company. The drill can operate as long as an hour and can chisel or drill cored holes up to six inches deep in materials ranging from basalt to pumice.

PIONEER VI REPORTS—

Solar Storm Ends Quiet Sun Year

The Earth is moving through a solar storm which appears to signal the end of the quiet Sun

Gemini VIII

(Continued from page 1)

After docking, Scott will egress from the spacecraft on a 25-foot umbilical tether and move to the adapter section where he will don a larger backpack and attach himself to a 75-foot tether. He will maneuver with a hand-held freon-powered maneuvering unit, similar to the unit used by Ed White in Gemini IV but with a longer lifetime of propellants.

Following Scott's ingress and hatch closure, Gemini VIII will maneuver into a different orbit than that of the target vehicle and commence a series of maneuvers to effect re-rendezvous.

On-board experiments include mass determination, UHF-VHF polarization, night image intensification, evaluation of a minimum-reaction power tool, zodiacal light photography, frog egg growth, cloud top spectrometer, nuclear emulsion, micrometeorite collection and bioassays of body fluids.

Gemini VIII splashdown nominally is scheduled for the West Atlantic Recovery Zone after 71 hours ground elapsed time at the beginning of the 45th revolution.

period of the last year or more.

This is reported from NASA's Pioneer VI interplanetary spacecraft and from Sun-monitoring stations on Earth.

NASA's Pioneer VI during the past several days reported its first major solar events and the highest solar wind velocity it has measured since launch last Dec. 16. A stream of solar particles is rushing past the spacecraft and the Earth at about 1,440,000 miles an hour.

This compares with the highest solar wind speed ever measured by a NASA spacecraft — Explorer XVIII — of about 1,675,000 miles an hour.

Dr. John Wolfe, Pioneer VI project scientist at NASA's Ames Research Center, Moffett Field, Calif., noted, however, that all of man's measurements of interplanetary space have been made during the past four years when the Sun's activity has been decreasing.

"We don't know how high solar wind velocities can go," he said, "because we have never had a vehicle out there when higher velocities would be expected."

The 11-year solar cycle will peak again about 1969.

The Stanford University experiment aboard Pioneer VI also reports increased solar activity. The Stanford experimenters send data from the University's 150-foot dish at Palo Alto, Calif., to the spacecraft. They then measure effects on the radio signal of the electron content between the spacecraft and the Earth.

Stations on Earth noted the solar storm by measuring larger than normal fluctuations in the strength of the Earth's magnetic field as a result of the bombardment of the magnetosphere by solar particles.

The Environmental Science Services Administration's Institute for Telecommunication Sciences and Aeronomy at Boulder, Colo., has reported that its Sun-monitoring stations on Earth have detected a complex sunspot region.

This region was the source of a Class III solar flare on Jan 17, a Class II flare on Jan 18, and Class I flares on Jan 20, 22, and 23. Class IV is a flare of maximum size and intensity.

Pioneer VI, managed by the Ames Research Center, is the

Singletons Offer Tickets For Tomorrow's Dance

The MSC Singleton Club tomorrow night will hold a dance party at the Villa Monterey, 9150 Gulf Freeway, at 8:30 pm.

Last-minute tickets are available from Jim Dunlap, Bldg. 2, Room 727—Ext. 3057, or from Gloria Martinez, Bldg. 30, Room 3087—Ext. 4168. Tickets are \$1 each for ladies and \$2 each for gents. All single MSC employees are welcome.

The Club will hold a cocktail party at 5:30 pm Tuesday, March 1 in the Blue Room of the Ellington AFB Officers' Club.

first of a new series of NASA interplanetary spacecraft which will make the first systematic survey of interplanetary space. One goal of the new Pioneers is to chart changes in space phenomena during an entire 11-year solar cycle.

The new spacecraft will survey a strip of space about 40 million miles wide around the Sun in the plane of the Earth's orbit. Because of the scan of their instruments and the fact that they measure particles arriving from all parts of solar space, the Pioneers will gather some data on regions far outside of the Earth's orbital plane.

Pioneer VI was 3,184,000 miles away from Earth yesterday and about 1.5 million miles behind the Earth on a solar orbit inside the Earth's orbit. This put the spacecraft some 2.8 million miles closer to the Sun than the Earth.

Pioneer VI also carries experiments to measure cosmic rays and strength of the solar magnetic field. Dr. Wolfe said these experiments probably will show changes in the level of solar cosmic rays and changes in the solar magnetic field as a result of the storm. Data for these experiments have not been reduced yet, however, and no measurements are available.

Rapid changes in strength of the Earth's magnetic field have been measured by the U. S. Coast and Geodetic Survey's remote magnetometer stations at Castel Rock in northern California's Santa Cruz mountains. The Castel Rock magnetic field station reports by direct line to the Ames Center.

The total vector (strength and direction) of the Earth's field for the past several days has been changing at the rate of 50 to 75 gamma (a measure of magnetic intensity) per hour. This compares with a rate of change of four to five gamma per hour during quiet periods.

Mardi Gras Raises Funds For Buying Mobile Blood Bank

Proceeds from a February 25 Mardi Gras costume ball at the Sylvan Beach Pavillion in La-Porte will go toward buying a mobile blood bank to serve the MSC-Clear Lake area.

Frank Hickey, Chief of PAO Protocol Branch and MSC representative to the board of directors of the Clear Lake-Bayshore Chapter of the Leukemia Society, Inc. announced that tickets to the ball are available at local restaurants, motels, banks and businesses. The tickets are \$10 a couple and are tax deductible. The king and queen of the ball will be selected on the basis of best costumes.

The Leukemia Society's mobile blood bank will serve leukemia, heart and cancer patients in the area when it becomes operational by the end of the year.